



Rijksinstituut voor Volksgezondheid  
en Milieu  
*Ministerie van Volksgezondheid,  
Welzijn en Sport*

# Onderzoeksprojecten RIVM & DIAPER data infrastructuur

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Bijeenkomst leernetwerk KOOZ  
13 februari 2025



# Agenda

1. Onderzoeksprojecten RIVM rond zwangerschap, geboorte en eerste jaren
  - Monitoringsfunctie eerste 1000 dagen
2. DIAPER data infrastructuur
3. Voorbeelden onderzoeken binnen DIAPER
4. Praktisch: zelf werken met DIAPER

# Onderzoeksprojecten RIVM

- Monitor Passende Bekostiging van de geboortezorg
- Monitor Kansrijke Start (landelijk en lokaal)
- Monitor Onbedoelde Zwangerschappen – 2 nieuwe publicaties in april





# Onderzoeksprojecten RIVM

## **Verschillende doelgroepen:**

Landelijk beleid, lokale praktijk, academische verbinding

## **Verschillende producten:**

Jaarlijkse factsheets, rapporten, kennisupdates, learning community (bijeenkomsten), websites, wetenschappelijke artikelen, proefschriften en presentaties

## **Uitgangspunten:**

Verschillende onderzoeksmethodieken, betrekken ervaringsdeskundigheid, meerlaags leren (lokaal, regionaal, nationaal, internationaal), open science



## Onderzoeksprojecten RIVM

- Monitor Passende Bekostiging van de geboortezorg
- Monitor Kansrijke Start (landelijk en lokaal)
- Monitor Onbedoelde Zwangerschappen – 2 nieuwe publicaties in april

Nieuw en overkoepelend:

**Monitoringsfunctie eerste 1000 dagen**



# Monitoringsfunctie eerste 1000 dagen

- Doel: meer inzicht in de gezondheid van (aanstaande) zwangeren, kinderen en het gezin  
& monitoren van ontwikkelingen (trends) in uitkomsten van het gezondheidsbeleid, preventie en zorg
- Beschikbare en nieuwe data samenbrengen, overzichtelijk maken en gezamenlijk duiden
- Samen met het veld
- 2024: governance en werkagenda opgesteld  
2025: aan de slag!

# Betrokken organisaties



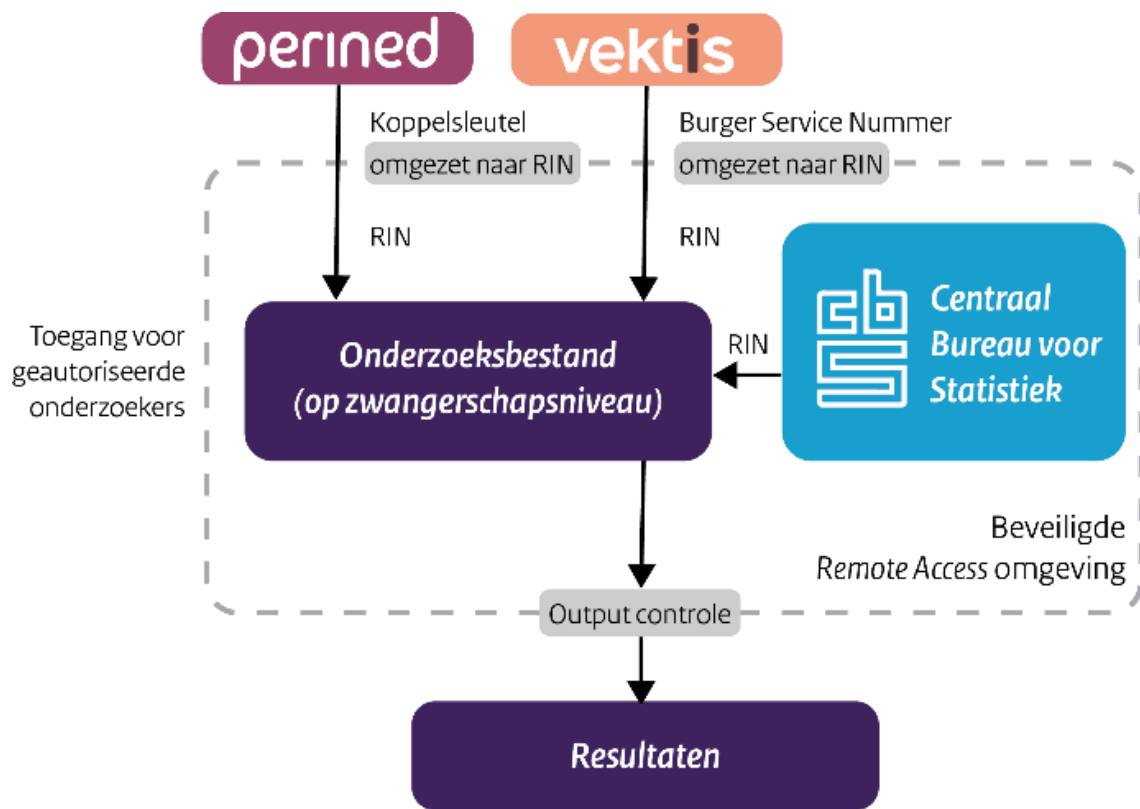


# Monitoringsfunctie eerste 1000 dagen in 2025

- Overzichtelijk en consistent maken bestaande indicatoren
- Delphi studie: selecteren indicatoren en gewenste uitsplitsing naar risico- en beschermende factoren
  - > online presenteren & gezamenlijk met het veld duiden
- Professionaliseren en uitbreiden van **DIAPER**
- Integreren bestaande RIVM monitors
- Afstemmen en samenwerken relevante stakeholders vanuit praktijk, beleid, ervaringsdeskundigheid en academische wereld



# DIAPER - Data InfrAstructure for ParEnts and childRen



RIN = Record Identification Number

**Observational Data for Integrated Maternity Care: Experiences with a Data-Infrastructure for Parents and Children in the Netherlands**

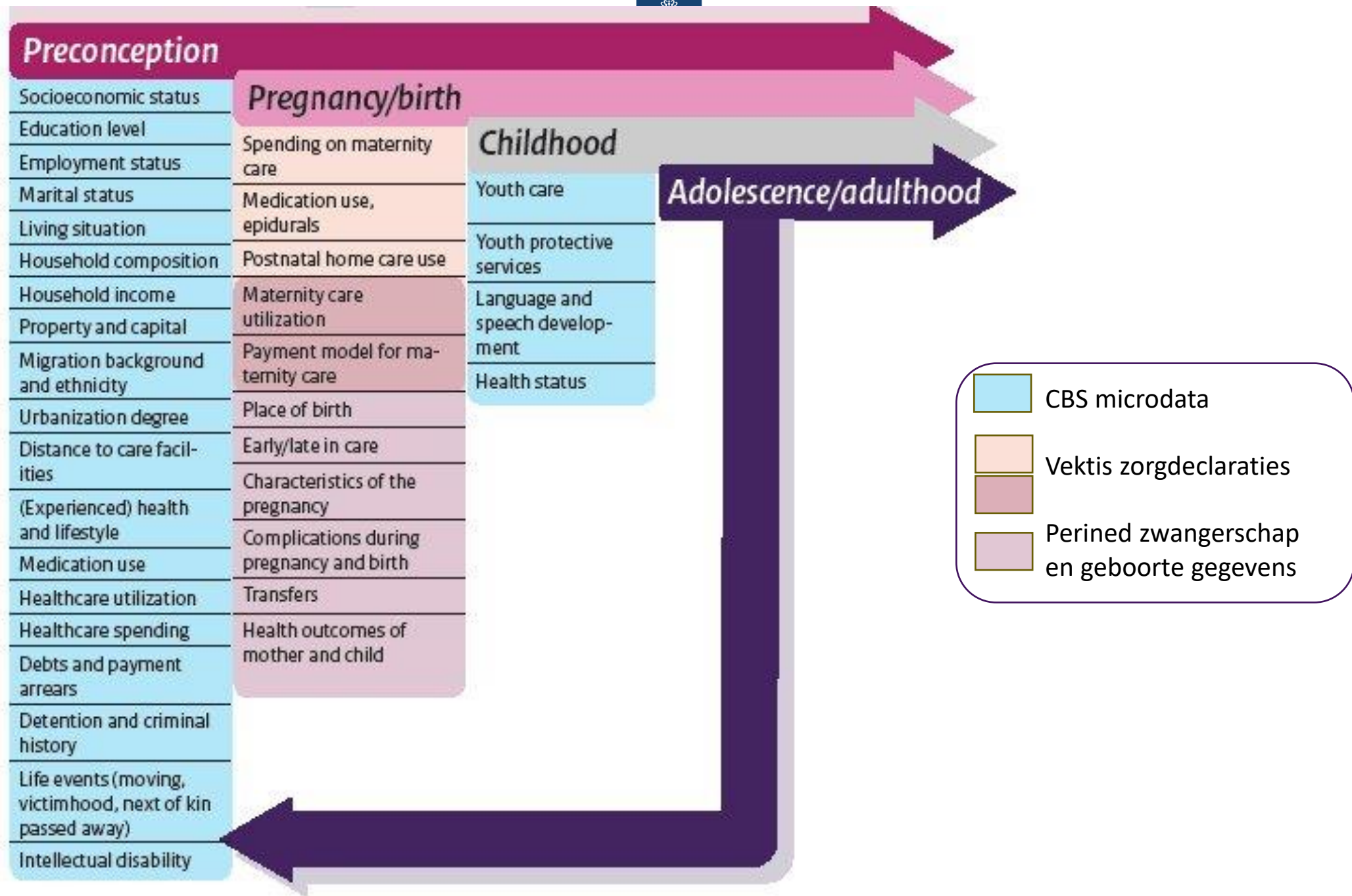
ZOE T. M. SCHEEFHALS  
ELINE F. DE VRIES  
JOYCE M. MOLENAAR  
MATTIJS E. NUMANS  
JEROEN N. STRULJIS

**ABSTRACT**  
**Introduction:** Observational data are increasingly seen as a valuable source for integrated care research. Especially since the growing availability of routinely collected data and quasi-experimental methods. The aim of this paper is to describe the potentials and challenges when using observational data for integrated maternity care research, based on our experience from developing and working with the Data-Infrastructure for Parents and children (DIAPER).  
**Methods and Results:** We provide a description of DIAPER, which is a linked data-infrastructure on the individual level based on maternity care claims data, quality and utilization of maternity care and data from municipal registries, covering the life course from preconception to adulthood. We then discuss potentials and practical applications of DIAPER such as to evaluate alternative payment models for integrated maternity care, to set the policy agenda regarding postpartum care, to provide insights into value of care and into provider variation, and to evaluate (policy) interventions designed to promote and support integrated maternity care. This is relevant for several stakeholders: policy makers, payers, providers and clients/patients. Based on experiences with DIAPER, we identify remaining challenges: missing data sources (especially self-reported outcomes), suboptimal quality of data, privacy concerns and potential biases introduced during data linkage, and describe how these challenges were tackled within the applications of DIAPER.  
**Conclusions:** With DIAPER we demonstrated that using observational data can be of added value for integrated care research, but also that challenges remain. It is essential to keep exploring and developing the possibilities of observational data and continue the discussions in the scientific community. Learning from each other's successes and failures will be critical.

**KEYWORDS:** observational data; routinely collected data; health policy; integrated care; integrated maternity care; data-infrastructure

**TO CITE THIS ARTICLE:** Scheefhals ZTM, de Vries EF, Molenaar JM, Numans ME, Strulj JN. Observational Data for Integrated Maternity Care: Experiences with a Data-Infrastructure for Parents and Children in the Netherlands. *International Journal of Integrated Care*, 2023; 23(4): 20, 1–11. DOI:10.1016/j.ijic.2023.101534

[Link](#)





# Voorbeelden DIAPER

## Monitor Onbedoelde Zwangerschappen

### 6. Tienermoeders: 2,8 op de 1.000 meisjes



#### ***Daling aantal tienermoeders stagneert***

Op 1 januari 2023 waren er in Nederland **2,8** tienermoeders per 1.000 meisjes van 15 tot 20 jaar (zie Tekstbox 2). Dit komt neer op 1.385 tienermoeders (11). De daling van het aantal tienermoeders van de afgelopen jaren (Figuur 8) lijkt te zijn gestagneerd. Het aantal is ongeveer gelijk aan dat van 1 januari 2022, namelijk 2,7 tienermoeders per 1.000 meisjes. In Flevoland waren op 1 januari 2023 de meeste tienermoeders per 1.000 meisjes (4,0) en in de **provincie Utrecht** de minste (1,8), zie Figuur 9.

Enkele achtergrondkenmerken van de tienermoeders zijn geanalyseerd, te beginnen met **leeftijd** bij de bevalling. Van de tienermoeders is 9 procent bevallen op 12- tot en met 15-jarige leeftijd (Figuur 10). De meeste tienermoeders zijn bevallen toen ze 19 jaar waren. **54 procent** van de tienermoeders had een **migratieachtergrond** (westers of niet-westers) en 6 procent van de tienermoeders heeft een

asielstatus gehad. Van de tienermoeders heeft 9 procent op het speciaal **onderwijs** gezeten of volgt zij speciaal onderwijs (12).

Zie de [RIVM-webpagina over Onbedoelde Zwangerschappen](#) voor meer informatie over de indicator.

#### **Tekstbox 2. Toelichting op indicator tienermoeders**

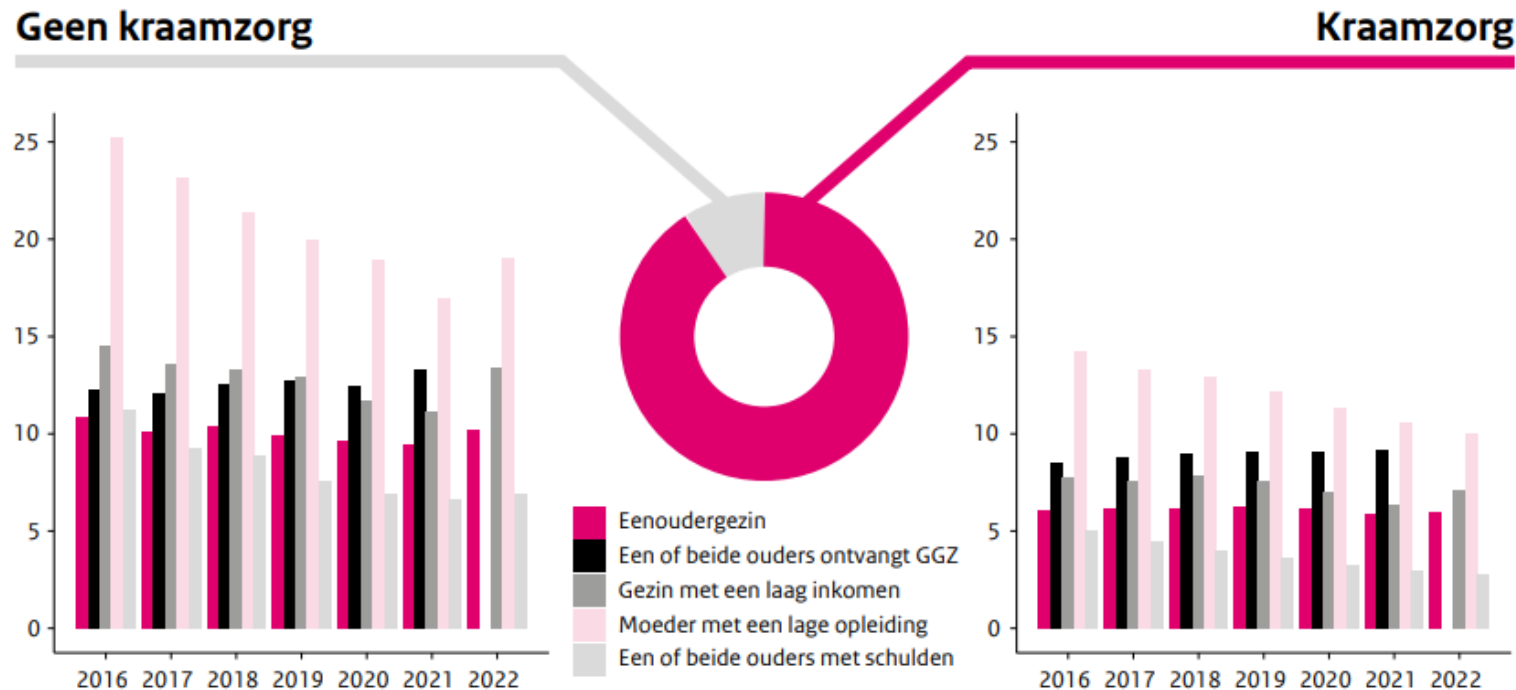
Deze indicator gaat over alle meisjes die een kind hebben op 1 januari 2023 en op 31 december 2022 19 jaar of jonger waren. Voor de achtergrondkenmerken van de tienermoeder is gekeken naar het jaar 2022. Dat is gedaan omdat er nog geen (volledige) gegevens over de achtergrondkenmerken beschikbaar waren op de peildatum van 1 januari 2023.



# Voorbeelden DIAPER

Monitor Kansrijke Start: % gezinnen dat wel/ geen kraamzorg ontvangt + uitsplitsing

**Figuur 17.** Kenmerken van gezinnen die wel of juist geen kraamzorg ontvangen voor het jaar 2022: eenoudergezin, GGZ-gebruik\* (één of beide ouders), gezin met laag huishoudinkomen (<10<sup>e</sup> percentiel), schulden (één of beide ouders) en laag opleidingsniveau van de moeder






# Voorbeelden DIAPER

## Monitor Kansrijke Start: Inzicht in kwetsbaarheid met data uit DIAPER & de gezondheidsmonitor

### Verschillende onderzoeksvragen:

- Hoe zit het met risico- en beschermende factoren?
- Hoe 'meet' je kwetsbaarheid met data? Hoe kun je dit monitoren?
- Hoeveel zwangeren/ gezinnen hebben te maken met een kwetsbare situatie?
- Wat is de relatie met zorggebruik en zorguitgaven (moeder en kind)?










## Predicting population-level vulnerability among pregnant women using routinely collected data and the added relevance of self-reported data

Joyce M. Molenaar <sup>1,2,\*</sup>, Ka Yin Leung <sup>3</sup>, Lindsey van der Meer <sup>4</sup>, Peter Paul F. Klein <sup>1</sup>, Jeroen N. Struijs <sup>1,2</sup>, Jessica C. Kiefte-de Jong <sup>2</sup>

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## Defining vulnerability subgroups among pregnant women using pre-pregnancy information: a latent class analysis

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<sup>4</sup> National Perinatal Epidemiology Unit, Nuffield Department of Population Health, University of Oxford, Oxford, UK

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**Background:** Early detection of vulnerability during or before pregnancy can contribute to optimizing the first 1000 days, a crucial period for children's development and health. We aimed to identify classes of vulnerability among pregnant women in the Netherlands using pre-pregnancy data on a wide range of social risk and protective factors, and validate these classes against the risk of adverse outcomes. **Methods:** We conducted a latent class analysis based on 42 variables derived from nationwide observational data sources and self-reported data. Variables included individual, socioeconomic, lifestyle, psychosocial and household characteristics, self-reported health, healthcare utilization, life-events and living conditions. We compared classes in relation to adverse outcomes using logistic regression analyses. **Results:** In the study population of 4172 women, we identified five latent classes. The largest 'healthy and socioeconomically stable'-class [ $n=2040$  (48.9%)] mostly shared protective factors, such as paid work and positively perceived health. The classes 'high care utilization' [ $n=485$  (11.6%)], 'socioeconomic vulnerability' [ $n=395$  (9.5%)] and 'psychosocial vulnerability' [ $n=1005$  (24.0%)] were characterized by risk factors limited to one specific domain and protective factors in others. Women classified into the 'multidimensional vulnerability'-class [ $n=250$  (6.0%)] shared multiple risk factors in different domains (psychosocial, medical and socioeconomic risk factors). Multidimensional vulnerability was associated with adverse outcomes, such as premature birth and caesarean section. **Conclusions:** Co-existence of multiple risk factors in various domains is associated with adverse outcomes for mother and child. Early detection of vulnerability and strategies to improve parental health and well-being might benefit from focussing on different domains and combining medical and social care and support.

health inequities. It is important to explore the factors to vulnerability during pregnancy and to predict multidimensional vulnerability in most cases, to predict multidimensional self-reported data can

[link](#)

[link](#)



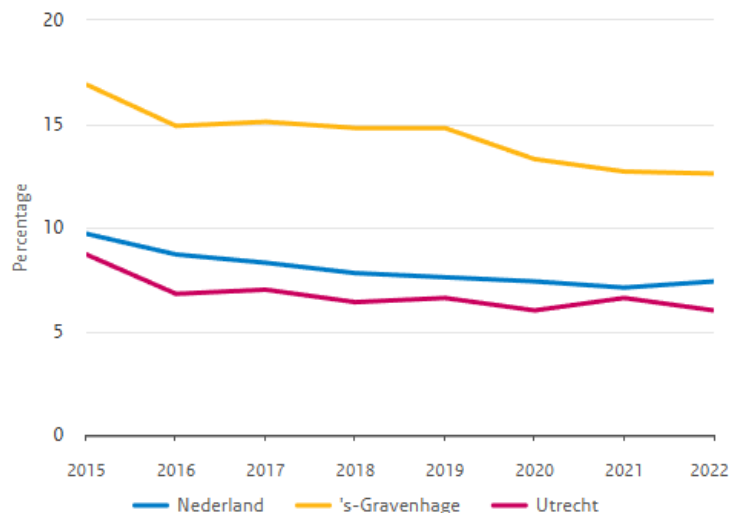
# Voorbeelden DIAPER

## Monitor Kansrijke Start: % zwangere vrouwen in een kwetsbare situatie [www.regiobeeld.nl/kansrijkestart](http://www.regiobeeld.nl/kansrijkestart)

Selecteer een indicator:

Zwangere vrouwen in een kwetsbare situatie

### Zwangere vrouwen in een kwetsbare situatie



Bron: CBS Microdata

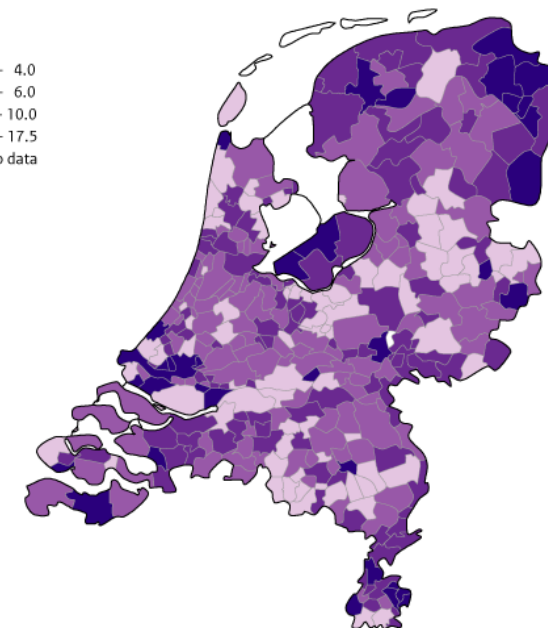
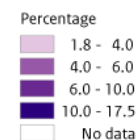


## Tijdens de zwangerschap

Indicatoren tijdens de zwangerschap geven inzicht in het aantal zwangeren in een mogelijk kwetsbare situatie. Het geeft dus inzicht in kwetsbaarheid in uw gemeente. Een aantal hiervan kunnen ook gebruikt worden voor inzicht in effect van beleid (percentage zwangere vrouwen met problematische schulden, in een zeer kwetsbare situatie, dat rookt of waarbij de zwangerschapsbegeleiding na de 10<sup>e</sup> week van de zwangerschap startte).

De weergegeven indicator is het aantal zwangeren dat op basis van een combinatie van verschillende aanwezige risicofactoren en een gebrek aan beschermende factoren te maken heeft met meervoudige kwetsbaarheid t.o.v. het totaal aantal zwangeren.

**Opmerking:** Meegenomen factoren over de moeder en het huishouden zijn in de berekening: leeftijd, etniciteit, aantal bevallingen, asielzoekersstatus, opleidingsniveau, huishoudinkomen, sociaaleconomische positie (bron van inkomen), schulden, type contract, gezinssituatie, burgerlijke staat, scheiding, gezinsgrootte, jeugdondersteuning in gezin, zorguitgaven (totaal, huisarts, ziekenhuis), medicatiegebruik, verslaving, licht verstandelijke beperking, slachtoffer/verdachte van misdrijf, detentie, verhuizingen, verlies partner of kind, woning- en motorvoertuigbezit, afstand tot huisarts, leefbaarheid van de buurt..

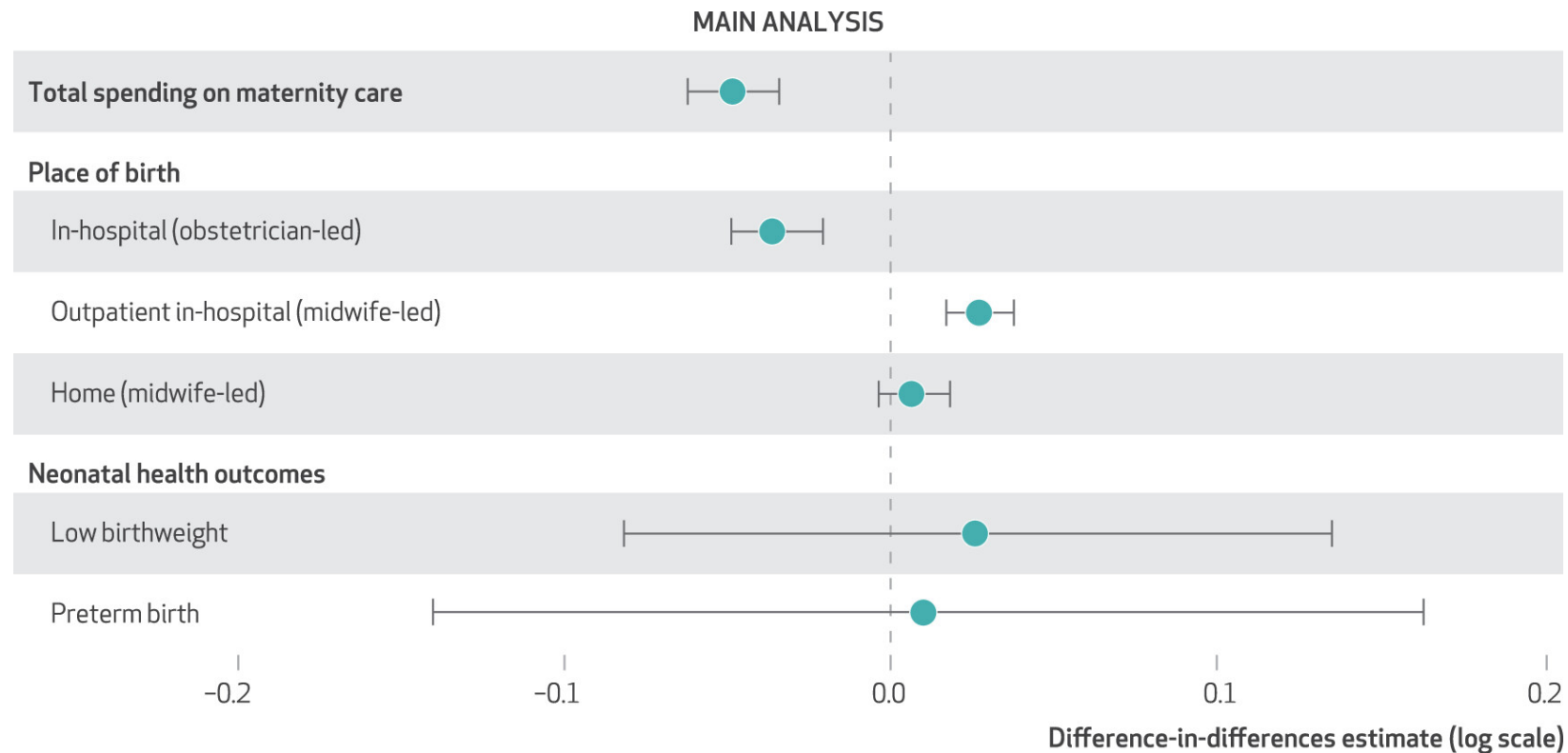




# Voorbeelden DIAPER

## Monitor Passende bekostiging van de geboortezorg

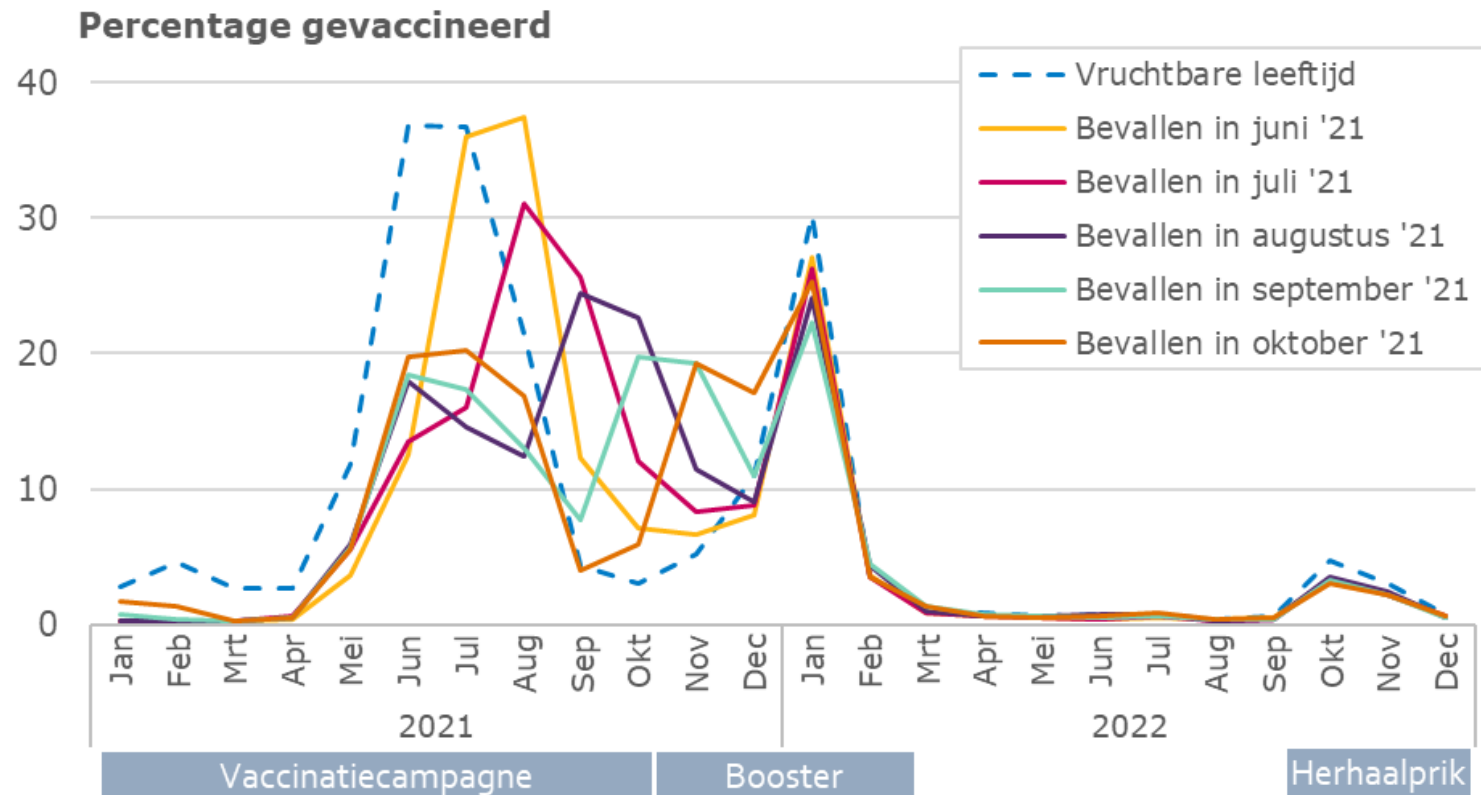
*Changes in total spending on maternity care, place of birth, and neonatal health outcomes in the Netherlands associated with participation in the bundled payment model for maternity care in 2017 and 2018*





# Voorbeelden DIAPER

Kennisnotitie Zwangeren en COVID-19-vaccinatie in 2021 en 2022 ([link](#))



- DIAPER verrijkt met COVID-19-vaccinatie gegevens
- Zwangerschapsperiode vergeleken met de datums van vaccinatie
- Vaccinatieopkomst tijdens zwangerschap lager. Vaccinatie vaak uitgesteld tot na de zwangerschap



# Voorbeelden DIAPER

## Externe projecten/onderzoeken

### Pregnancy outcomes of forced migrants in the Netherlands: A national registry-based study

J.B. Tankink<sup>a,\*</sup>, L.C.M. Bertens<sup>a</sup>, J.P. de Graaf<sup>a</sup>, M.E.T.C. van den Muijsenbergh<sup>b,c</sup>, J.N. Struijs<sup>d,e</sup>, B. Goodarzi<sup>f,g,h,i</sup>, A. Franx<sup>a</sup>

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#### ARTICLE INFO

**Keywords:**  
 Forced migration  
 Refugees  
 Asylum seekers  
 Pregnancy  
 Childbirth  
 Perinatal health inequity

#### ABSTRACT

**Background:** The rise of global forced migration urges healthcare systems to respond migrants (FM) during pregnancy and childbirth. Yet, comprehensive data on the health in destination countries remain scarce. This study aimed to describe the characteristic natal outcomes of pregnancy in this specific migrant population on a national scale and explore differences from other populations.

**Methods:** The Dutch perinatal registry was linked to national migration data to analyze FM (2014–2019), using non-migrants (NM) and resident migrants (RM) as reference. Primary outcome rates (% [95% CI]) for a range of primary and secondary pregnancy outcomes included perinatal mortality, small for gestational age infants (SGA), preterm birth, section (CS), for which we also calculated the crude relative risk (RR [95% CI]) of FM. In addition, we conducted binary logistic regression analyses on primary outcomes to RR (aORs [95% CIs]) while controlling for multiple births, maternal age and parity.

**Findings:** Compared to the NM group, the FM group had increased risks of perinatal mortality (1.20–1.88), SGA (1.65 [1.59–1.71]), and emergency CS (1.19 [1.13–1.25]). Complicated risks of SGA (1.17 [1.13–1.22]). In contrast, the risk of preterm birth was lower (0.76–0.86) and RM (0.83 [0.77–0.88]). These differences were confirmed in the adjusted secondary outcomes included higher rates of late antenatal care in FM (29.4% [28.5–30.6]) and RM (15.5% [15.1–15.9]). Rates of planned CS were similarly elevated (13.7–14.8) versus 7.8% [7.7–7.8] and 9.6% [9.5–9.7]), while FM had lower rates of (3.9% [3.6–4.2]) versus 6.8% [6.8–6.9] and 5.7% [5.6–5.9]).

**Conclusion:** This first Dutch registry-based study demonstrated increased risks of multiple pregnancy outcomes in forced migrants. Our results emphasize the imperative to further migration-related disparities, dismantle structural barriers to health among forced migrants, and research effort equitable care for every individual, regardless of migration status.

[Link](#)

### Socioeconomic inequalities in the uptake of postpartum care at home across Dutch neighbourhoods

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**Background:** Postpartum care focuses on prevention of health problems by performing medical check-ups and through enhancing maternal empowerment, the parent-infant interaction and knowledge about mother's own health and that of her newborn. We aimed to investigate whether there was significant clustering within neighbourhoods regarding the uptake of postpartum care and to what extent neighbourhood-level differences are explained by individual socio-demographic factors, pregnancy-related factors and neighbourhood-level determinants (i.e. deprivation and urbanization). **Methods:** A nationwide population-based observational study was carried out using linked routinely collected healthcare data from appropriate-for-gestational-age weight live-born term singleton deliveries (2015–18) in the Netherlands. We performed two-level multivariable logistic regression analyses, using three different models. Model 1 contained no explanatory variables and was used to assess clustering of postpartum care uptake within neighbourhoods. In model 2, individual-level determinants were added one by one and in model 3, neighbourhood-level determinants were added. **Results:** About 520 818 births were included. Multilevel modelling showed that 11% of the total variance in postpartum care uptake could be attributed to the neighbourhood of residence. Individual characteristics explained 38% of the neighbourhood variance, of which income and migration background were the most important contributors. An additional 6% of the variation could be explained by neighbourhood-level determinants. **Conclusion:** We found substantial neighbourhood differences in postpartum care uptake. These differences are influenced by a complex interplay between individual-level and neighbourhood-level determinants, highlighting the importance of addressing both individual and neighbourhood-level determinants to improve the uptake of postpartum care and therewith overall community health.

[Link](#)

### Effect of COVID-19 lockdown on maternity care and maternal outcome in the Netherlands: a national quasi-experimental study

B.Y. Gravesteyn<sup>a,b,c,\*</sup>, N.W. Boderie<sup>c</sup>, T. van den Akker<sup>d,e,f</sup>, L.C.M. Bertens<sup>g</sup>, K. Bloemenkamp<sup>h</sup>, L. Burgos Ochoa<sup>g,i</sup>, A. de Jonge<sup>j,k,l,m</sup>, B.M. Kazemier<sup>a,b,h</sup>, P.P.F. Klein<sup>n</sup>, I. Kwint-Reijnders<sup>g,q</sup>, J.A. Labrecque<sup>o</sup>, B.W. Mol<sup>p</sup>, S.A. Obermann-Borst<sup>q</sup>, L. Peters<sup>j,k,m</sup>, A.C.J. Ravelli<sup>a,b,r</sup>, A. Rosman<sup>s</sup>, J.V. Been<sup>c,g,t,#</sup>, C.J. de Groot<sup>a,b,#</sup>, on behalf of the PREPARE-consortium

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#### ARTICLE INFO

**Article history:**  
 Received 2 April 2024  
 Received in revised form 29 May 2024  
 Accepted 17 June 2024  
 Available online 20 July 2024

**Keywords:**  
 Maternal health  
 SARS-CoV-2  
 COVID-19  
 Homebirth  
 Natural experiment

#### ABSTRACT

**Objectives:** The COVID-19 pandemic and associated lockdowns disrupted health High-income countries observed a decrease in preterm births during lockdown pregnancy-related outcomes were also likely affected. This study investigates the COVID-19 lockdown (March–June 2020) on provision of maternity care and maternal related outcomes in the Netherlands.

**Study design:** National quasi-experimental study.  
**Methods:** Multiple linked national registries were used, and all births from a gestational week in 2010–2020 were included. In births starting in midwife-led primary care effect of lockdown on provision of care. In the general pregnant population, the impact of labour and maternal morbidity was assessed. A difference-in-regression-discontinuity design was used to derive causal estimates for the year 2020.

**Results:** A total of 1 030 778 births were included. During the lockdown, births to women

[Link](#)



# DIAPER professionaliseren en uitbreiden in 2025 (en later)

- Aanvullende databronnen:  
Bijvoorbeeld: data vanuit JGZ, luchtkwaliteit, huisartsengegevens, NIPT (prenatale screening), preconceptiedata via ZwangerWijzer, PREMs en PROMs (via Perined)
- Toegankelijk(er) voor externe onderzoekers
- Aandacht voor: kwaliteitsbewaking, open science, gegevensbescherming
- Online beschikbaar stellen van de scripts, [GitHub - rivm-syso/DIAPER](https://github.com/rivm-syso/DIAPER)



## Praktisch: zelf werken met DIAPER

- Er zijn veel mogelijkheden (extra data koppelen, etc.)
- Neem laagdrempelig contact met ons op, ook in verkennende fase :  
[diaper@rivm.nl](mailto:diaper@rivm.nl)  
Bijvoorbeeld voor ZonMw subsidieaanvraag binnen Zwangerschap & geboorte 3
- Kosten en ondersteuning vanuit RIVM is maatwerk
- Altijd toestemming nodig van bronleveranciers (streven = 1 procedure)
- De data is niet van het RIVM. We koppelen en gebruiken de data binnen de monitoringsfunctie met 'publiek geld', en stellen het graag breder beschikbaar
- Meer informatie: [www.rivm.nl/monitoren-zwangerschap-en-geboorte/diaper](http://www.rivm.nl/monitoren-zwangerschap-en-geboorte/diaper)



Rijksinstituut voor Volksgezondheid  
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# Vragen en ideeën?

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Bijeenkomst leernetwerk KOOZ  
13 februari 2025